

THE RELATIONSHIP BETWEEN EARLY DISABILITY ONSET AND EDUCATION AND EMPLOYMENT

Pamela Loprest
Elaine Maag

The Urban Institute
2100 M Street, NW
Washington, DC 20036

September 2003

This research was funded by the Social Security Administration under a grant from the Disability Research Institute at University of Illinois at Urbana-Champaign. The authors would like to acknowledge the excellent research assistance of Kevin McManus. The views expressed in this paper do not necessarily reflect those of The Urban Institute or its funders. All errors are the responsibility of the authors.

The Relationship Between Early Disability Onset and Education and Employment

ABSTRACT

The early onset of disability (at birth through young adulthood) can affect a person's employment outcomes in myriad ways. In addition to the direct effect of disability on employment, early onset of disability likely affects the acquisition of education and job skills (human capital). This reduced "investment" in human capital in turn may reduce the individual's employment and earnings prospects throughout their lifetime. If this is the case, people with early onset of disability may be doubly disadvantaged when it comes to later employment prospects.

This study analyzes how early onset of disability (onset prior to age 22) affects employment opportunities both directly and as a result of reduced investment in human capital (education) for a younger cohort (ages 22 to 35) and older cohort (ages 44 to 54). In our young cohort, we find that people with early onset of disability have a lower probability of completing high school and a lower probability of being employed than those without disabilities. Lower employment rates result from both lower levels of high school completion and a direct negative impact of disability on work. In the older cohort, we find the employment of those with disability is lower than those without disability, regardless of age of onset. However, those with early onset of disability have significantly higher employment rates than those with later onset of disability (after age 22). We hypothesize that this is a result of people with onset of disability prior to age 22 either choose careers that can be more easily accommodated than the careers people with later disability onset have, or that people with early onset of disability are more likely to be adept at seeking and using accommodations than those with later disability onset.

These results suggest that policies and programs to increase employment of persons with disabilities should focus on ways to increase education levels of those with early onset of disability. They also suggest that return-to-work efforts focused on older cohorts of persons with disabilities may want to separately target programs to those with early onset of disability.

The Relationship Between Early Disability Onset and Education and Employment

Disability policy in recent decades has focused on the importance of increasing employment opportunities for people with disabilities, most notably with the passage of the landmark Americans with Disabilities Act but also through increased focus by the Social Security Administration on return-to-work programs. During this same period, concerns have risen over the increased number of young people receiving SSA disability benefits, both Supplemental Security Income (SSI) and Social Security Disability Income (SSDI). Given the disincentives to work inherent in receipt of these programs, the participation of younger recipients may contribute to their lifelong dependence on these programs. This trend toward younger participants also brings into question whether the return-to-work approach of SSA and other programs is appropriate for persons who have experienced onset of disability at an early age. Traditionally, these programs have focused on a clientele who have experienced later onset of disability, usually after accumulating work experience.

Very little literature has focused on how the timing of disability may influence education and employment outcomes. The early onset of disability (at birth through young adulthood) can affect a person's employment outcomes in myriad ways. In addition to the direct effect of disability on employment, early onset of disability likely affects the acquisition of education and job skills (human capital). This reduced "investment" in human capital in turn may reduce the individual's employment and earnings prospects throughout their lifetime. If this is the case, people with early onset of disability may be doubly disadvantaged when it comes to later employment prospects.

This study examines the differential employment outcomes for individuals with early onset of disability compared with both those who are not disabled and those who experience disability later in life. Because people with early onset may face greater obstacles to completing schooling, particularly secondary education, the study focuses on the extent to which early onset diminishes educational outcomes and the effect of this disadvantage on later employment. We address the following questions:

- To what extent are the educational outcomes of persons with early onset of disability reduced relative to persons without disabilities?
- How do persons with early onset of disability differ in employment outcomes from those without disability and to what extent is this due to differences in education?
- Does onset of disability at an early age continue to affect employment outcomes later in life? How does employment of those who had an early onset of disability compare with employment of those who had an onset of disability at later ages?

The remainder of this paper is organized as follows. First, we review relevant literature and set the context for our study. Then we discuss our methods, data, and how we define disability and onset. We present results in two sections, our analysis of a young cohort and our analysis of an older cohort. Finally, we provide a summary and conclusions.

Background Context

Low employment rates of persons with disabilities and greater numbers of young people receiving disability benefits have focused attention on how to help young people with disabilities reach their full economic potential. These low employment rates are cause for concern not only because of the economic benefits that accompany work, but other benefits including reducing social isolation and supporting full participation in society (Schur 2002). Educational attainment plays a key role in employment—affecting future employment and earnings. Research has shown the positive effect education has on employment opportunities for people with disabilities (DeLoach 1992).

One avenue for policy is to directly address the generally lower levels of educational completion of persons with disabilities. To do this, we first need to understand how onset of disability at an early age affects educational completion and later employment. Understanding whether these outcomes are affected by the timing of disability may allow program administrators to develop and target services to people with early disability onset, hopefully increasing their future economic independence.

As a group, people with disabilities have lower incomes and higher rates of poverty than people without disabilities (World Bank 1999). Low levels of employment and earnings play a key role in these worse economic outcomes. Burkhauser et al. (2001) show that the share of household income coming from the earnings of men with disabilities declined throughout the 1990s. In 1989, the share of mean household income that came from people with disabilities was 20 percent. By 1998, the labor earnings of men with disabilities accounted for less than 15 percent of mean household income. Young people with disabilities also have lower employment outcomes than their non-disabled counterparts. While 38.8 percent of people with a work disability between the ages of 25 and 34 are in the labor force, 87.6 percent of their non-disabled peers are in the labor force (Stoddard, et al. 1998).

Prior research shows that education effects employment and compensation – and that effect has increased significantly in the recent past. One study found that in 1995, 25-34 year old males who had graduated from college earned 52 percent more than their peers who had graduated from high school. In 1980, this gap was only 19 percent (Kane 1999). People with at least a bachelor's degree are more likely to be employed than their peers who had lower levels of education. And for males, the employment rate for those who had not finished high school decreased between 1971 and 1998, from 87.9 percent to 78.5 percent. In contrast, employment rates for females at all education levels increased over this time period, though more slowly for those who had not received a high school degree (U.S. Department of Education 2000).

Persons with disabilities have lower education levels than those without disabilities. They are more likely to have less than a high school education and less likely to have some years of college than those without disabilities (Yelin and Trupin 2002). Only 27 percent of youths with disabilities are likely to enroll in post-secondary education compared to 68 percent of youths without disabilities (Blackorby and Wagner 1996). Increasing educational attainment has been shown to be associated with greater increases in labor force participation for people with disabilities than people without disabilities, although absolute rates of labor force participation remain lower (Yelin and Trupin 2002).

In addition, government programs that provide benefits to persons with disability are serving increasing numbers of young persons. The average age of Supplemental Security Income (SSI) and Social Security Disability Insurance (SSDI) recipients is falling (Rupp 1998). The number of young adults under age 30 receiving these benefits increased 43 percent between 1989 and 1993 (Laplante 1996). In part, this is due to increased eligibility of children for SSI benefits and their transition to the adult SSI program. Recent growth may also be attributed to contractions of the General Assistance program (Stapleton, et al. 1998) and a move from participation in Aid to Families with Dependent Children (now Temporary Assistance for Needy Families) to SSI (Stapleton, et al. 2002). Rupp and Scott (1998) also point out that young people receiving SSI benefits have long expected durations of benefit receipt, for many their entire lifetime. And it has been well-documented that participation in SSI or SSDI has a negative impact on the likelihood of employment (Bound and Burkhauser 1999).

Policies aimed at increasing employment of persons with disabilities are often focused on those who experienced disability onset at later ages and not on education. Vocational Rehabilitation (VR) traditionally served persons with disabilities that had significant work histories and had accumulated human capital before experiencing a disability. SSA has not traditionally had a focus on education in its return-to-work strategies. Persons with earlier onset of disability may require different types of support. Policies and programs that intervene at the time of secondary schooling or while post-secondary decisions are being made may be essential to increasing employment outcomes across an entire lifetime. All of these factors argue for increased understanding of employment outcomes for young adults with disabilities and how to better their economic position.

Examining how the age of disability onset affects a person's education and later employment is one part of this understanding. But very little research has focused on age of onset as a lens for viewing the experiences of young people with disabilities throughout their working life. Information on onset has been used in primarily two ways. First, researchers use onset information to estimate incidence (U.S. Department of Health and Human Services 1999). Second, researchers examine age of onset and its connection to retirement and application for disability benefits (Benitez-Silva, et al. 1999; Burkhauser, Couch and Phillips 1996). This research focuses on varying age of onset among older workers ages 40 - 65, many who had significant labor market experience. Limited research has attempted to understand the labor market responses of younger

individuals who experience the onset of disability. Daly and Bound (1996) examine differences in how people with early and later onset remain in the labor force. They find that younger workers either use an employer provided accommodation or they choose to find a different job while older workers rely on employer accommodations.

Other research has focused on specific types of disability that are primarily early onset to address the needs of that group, such as those with developmental disabilities or cerebral palsy (Boyle, Decoufle and Yeargin-Allsopp M 1994; Kregel 2001). Research on specific groups is necessary and beneficial as it allows for a level of detailed understanding for a certain disability that cannot be supported by a large national survey. Our research using a national cross-section of those with early onset of disability can provide a context for understanding the research outcomes on specific groups.

Data and Definitions

This study uses data from the 1994 and 1995 National Health Interview Survey - Disability Supplement (NHIS-D). Identical questions in both years of this survey allow us to combine the samples increasing sample size and providing more reliable estimates. The NHIS is a nationally representative cross-sectional survey administered to approximately 45,000 households each year that collects a wide variety of information on disability, employment, and income.¹

The disability supplement in 1994 and 1995 consists of two phases: the phase 1 disability survey administered to all core survey respondents and the phase 2 survey, also called the Disability Follow-back Survey (DFS), that surveyed a subset of core respondents who were defined using phase 1 data as having a disability. Phase 1 of the disability supplement asks detailed information on conditions, impairments, and activity limitations including timing of onset. Phase 2, the DFS, contains detailed information on employment.

Defining Disability and Onset

We define disability based on the presence of activity and functional limitations.² This definition is particularly appropriate when interested in the connection between disability and work, because it is the limitation in activity that is disabling, not necessarily the condition or impairment. For example, not all individuals with heart conditions will have limitations in activities due to this condition. We include in our definition those persons who report difficulty with at least one activity of daily living (ADL) or instrumental activity of daily living (IADL) or inability to perform one or more functional activities. The individual must report that this difficulty/inability has lasted or will last for at least 12 months. The specific activities considered include standard

¹ The NHIS-D is a complex survey sample and all tests for significance reported in the paper take into account the sample design. All reported statistics are calculated using appropriate weights. Unless otherwise indicated, only statistically significant differences ($p < 0.05$) are reported.

² This follows the definition we used in previous work with these data (Loprest and Maag 2003), and other research addressing the connection of disability and employment.

measures of ADLs and IADLs³, and physical functions that include lifting 10 pounds, walking up 10 steps, walking a quarter mile, standing for 20 minutes, bending down from a standing position, reaching up over the head or out to shake a hand, using fingers to grasp, and holding a pencil. Because the functional limitations are frequently less severe than ADLs or IADLs, only those people who report being completely unable to perform a functional activity are included in our sample. Of all persons ages 22 to 64, 7.2 percent have a disability according to this definition.

We define onset of disability as the age when a survey respondent reports first having trouble with a specific ADL, IADL, or functional activity used in our definition. Phase 1 of the NHIS-D asks all respondents how old they were when they first had a problem with that particular activity. Initially, they are asked to provide a specific age when the limitations occurred. For those who refuse to answer, an indicator of whether the limitation started before age 18 or before age 22 is asked. Allowing for this “range” response limits non-response rates for these questions. However, only a small percentage of respondents actually report these range answers. For those with difficulty or inability performing multiple activities, we define age of onset as the earliest age of problem onset reported among these activities.⁴ Of all persons ages 22 to 64 with disabilities by our definition, 16.3 percent report disability onset under age 22.⁵

We define early onset as those reporting onset of at least one activity limitation under age 22. We focus on the cut-off of age 22 for two reasons. By age 22, the large majority of the population has generally completed formal education, thus allowing for a cleaner measurement of differences in education levels. Second, the formulation of the range questions makes using a cutoff of 22 or 18 most feasible. Using a cutoff of age 22 versus age 18 allows for a slightly larger sample size. However, we know there may be differences in outcomes by age of onset within this group. For example, there are likely differences in disability onset at birth compared to onset at age 20. We, therefore, present some of our results for people who experience the onset of disability prior to age 5, the age when most people would expect to begin formal schooling.

When examining employment outcomes, it is an advantage to define disability onset in relation to the beginning of difficulties with activities rather than defining it in relation to the onset of a particular condition. The core NHIS provides information on the onset age of conditions that were the cause of an activity limitation, but not the onset of the activity limitation. This distinction is potentially important. The onset of the cause of the limitation is not necessarily the same as measuring the onset of the activity limitation itself. For example, a person may indicate that multiple sclerosis (MS) is the condition related to their inability to walk. However, the date that the MS was diagnosed may be

³ ADLs include bathing or showering, dressing, eating, getting in and out of bed or chairs, using the toilet including getting to the toilet, and getting around inside the home. IADLs include preparing own meals, shopping for personal items, managing money, using the telephone, doing heavy work around the house, and doing light work around the house.

⁴ The appendix discusses our sensitivity analyses around variations in this definition of onset.

⁵ Of all persons ages 22 to 64 with disabilities, 2.1 percent do not report an onset age and so are excluded from our analyses.

quite different than the date the person became unable to walk. While information on condition onset is necessary for measuring the incidence of conditions in the population, it may not coincide with the onset of a difficulty performing a specific activity.⁶

This definition of onset relies on individual's recall to provide the age of onset. For some in our sample, this period of recall is extremely long. To assess the extent to which this is an issue in the data, we examine onset dates for specific conditions that tend to happen early in life, e.g. cerebral palsy and assess whether respondents answer the questions in anticipated ways. We find that, of the 40 people reporting cerebral palsy who also have a disability as defined for this analysis, all 40 report onset at birth, as anticipated. In contrast, of the 104 people reporting blindness, a condition we anticipate will have a much more distributed onset age, we find 16 people report an early onset and 88 report a later onset.

Our measure of onset is defined at first onset of activity limitation. Some recipients may experience progression in the severity of their limitations after onset. We address this issue by separately examining severity of limitations measured at the time we measure outcomes. Severity is defined as those who are unable to perform at least one activity.

Using these data and definitions, we define two samples a young cohort ages 22 to 35 and an older cohort ages 44 to 54. In total, there are 41,128 people in this young cohort sample. There are 304 persons with disability onset before age 22 – 13, 130 of whom became disabled prior to age 5 and 174 became disabled at age 5 or later, but prior to the age of 22. The older cohort has a sample size of 26,078, with 203 persons with early onset and 1,101 persons with late onset (after age 22). We include in our late onset group only those who had an onset of disability after age 22 and at least three years prior to their current age.⁷

Empirical Methods

This study examines the connection between early onset of disability and education and employment outcomes. We expect early disability onset has an effect on educational attainment. Traditionally, people complete most of their formal schooling in the early part of their lives. If disability onset occurs prior to school completion, we hypothesize it may severely hinder a person's ability to complete their education. This, in turn, will affect their chances of becoming employed, and if they do become employed, their compensation. The impact on employment and earnings through education is in addition to any direct affect that the disability (or severity the disability) has on employment.

⁶ It was beyond the scope of this project to compare the onset age of conditions with the onset age of activity limitations for those in our sample. Future work conducting such a comparison can shed light on how closely self-reported condition onset proxies limitation onset.

⁷ This exclusion removes 345 persons in this age group from the analysis.

Since only a minority of those who have not completed high school by age 22 will go on to gain additional education, it is likely that the impact of not completing secondary school will remain over the course of that person's working life. In addition, lower employment at an early age leads to lower accumulated work experience over time. This means that even at older ages, we expect that those with an early onset of disability will continue to have lower employment than those without disabilities.

We are also interested in understanding whether those with early onset of disability have different employment and earnings than those with later onset of disability. In addition to considering whether to intervene at the secondary school level for those with early onset, we would like to know whether programs should consider targeting services to those with early and late ages of onset among an older cohort of persons with disabilities.

We do not have as clear an expectation on whether employment outcomes for those with early onset will be better or worse than those with later onset. We expect that people with later disability onset face fewer deficits in education relative to people with early onset and have accumulated more work experience. This, in turn, could point toward higher employment rates and wages for those with later onset. However, those with later onset may have difficulties adapting to the possible limitations of their disability on work, either in changing job tasks or moving to a completely different type of work. Because of these difficulties, more of those with later onset may drop out of the labor market than those with early onset.

Of course, the structure of government disability benefit programs influences labor market participation for both groups. Long-term receipt of disability benefits among persons with early onset of disability may lead to diminished employment in later years while disincentives to work inherent in benefit programs and the value of disability benefits relative to alternative work options reduces employment for both groups of persons with disability.

Young Cohort Analysis

We divide the study into two parts. The first part examines education and employment outcomes for persons with early onset of disability compared to those without disability. We focus on a cohort of persons in the early part of their working lives – what we term a “young cohort”, ages 22 to 35, comparing those with an early onset of disability (prior to age 22) and those without disabilities.⁸ This young cohort will likely have completed most of their formal education. Members of this young cohort

⁸ A small group of people in the young cohort experience disability between ages 22 and 35. We exclude them from our analysis because their employment status may be highly influenced by the immediate after-effects of developing a disability that might not be reflective of the impact of disability on work history in the longer run. For example, a person who suffers a severe back injury would likely need to leave the workforce temporarily in order to participate in appropriate rehabilitative activities, but their long-term prognosis might include returning to the workforce.

are less likely to have received additional training and advancement opportunities than an older cohort of individuals.

We first provide descriptive comparisons of demographics (including living arrangements), income and benefit receipt, education, and employment (including hours and earnings) for this young cohort. We then measure the extent to which early onset of disability is associated with a lower probability of completing high school. We estimate the following equation using logistic regression:

$$\text{Pr(complete high school)} = F(\text{Early Onset, Demographics, Severity})$$

Demographics include race and sex.⁹ It is clear that there is a great deal of variation in severity and type of disability among the group of young people with disability onset before age 22. Because severity of disability likely plays a role in high school completion, we separately control for severity with a measure of severity of activity limitation. It is also possible that those with onset before age 5 have a different likelihood of completing high school than those with onset from ages 5 to 22. To test for this we estimate an alternate model allowing for a differential impact on education of those with onset age less than 5 years old.

Finally, it is possible that specific types of disabilities are associated with different likelihood of completing high school. In particular, disabilities that directly impact learning abilities may be associated with lower levels of education. If these types of disability tend to occur at early ages, then our indicator of early onset may be representing those with disabilities that inherently are correlated with less ability to complete schooling. While this would not preclude intervention strategies to boost human capital investment and school completion, it could have different implications for what types of policies are needed. Unfortunately, we are unable to control for many different types of disabilities because of small sample sizes. However, to test this hypothesis, we estimate an alternate specification that includes an indicator for the presence of mental retardation.

We also estimate for this young cohort the connection between early onset of disability and employment. The logistic regression model we estimate is

$$\text{Pr(working)} = F(\text{Early Onset, Severity, High School Completion, Demographics})$$

These factors are consistent with the first model. Again, we control for race and sex, severity of activity limitations, and early onset of disability. In addition, we include an indicator for whether or not a person completed high school. We again test alternate specifications of disability by controlling for whether the disability onset occurred at or before age 5 and whether or not the person reports having mental retardation.

⁹ Additional regressions were run controlling for age, but because there is only a narrow range of ages in this sample, these control were dropped.

It is clear that receipt of SSI or SSDI is a disincentive to work. To address this potential disincentive and to try to separate the impact of benefit receipt and disability on employment, we include models with an indicator for respondents' receipt of SSI or SSDI benefits. While it is clear that receipt of SSI or SSDI is a disincentive to work, the estimated coefficient on benefit receipt cannot be interpreted simply as the negative impact of the program's work disincentives. The relationship between benefits and employment is complex, because the decision to apply for benefits in the first place may result from the respondent's belief that they have a low likelihood of being able to work. This indicator may be capturing respondents' "ability" or "desire" to work. Our indicator for severity addresses this concern in part, but it is likely the SSI/DI indicator will reflect these unmeasured factors leading to benefit application.¹⁰

Analysis of Older Cohort

The second part of the study examines the extent to which individuals with early onset of disability have different education and employment outcomes than those with an onset of disability later in life. We focus on an older cohort, ages 44 to 55. We choose this older cohort in order to identify outcomes for individuals with late onset. It is important to focus on a similar age cohort for early and late onset, because regardless of disability, there are many differences in labor market outcomes over the life cycle. Using this cohort, we conduct a descriptive analysis using a three-way comparison of those with early onset of disability, later onset of disability, and without disability.

Later onset of disability is defined as those in this age cohort who experienced a disability after age 22 but three or more years prior to the interview. We allow this lag time to limit temporary declines in employment that might occur immediately following disability onset. The descriptive analysis shows differences in employment (including hours and earnings), education level, and other factors that might influence employment. These are the same as in the first part of the study: demographic characteristics, severity of disability, income and benefit receipt and also age and presence of a mental health condition.

We then measure the connection between early onset of disability and education and early onset of disability and employment outcomes using multivariate regression models. We estimate logit models on the probability of work, defined as having worked at all in the two weeks prior to the survey interview. Our model is as follows:

$$\text{Pr}(\text{working}) = F(\text{Disability Onset, Severity, Demographics, Education})$$

The first model specification we estimate includes a separate indicator for early onset and for disability. The early onset indicator gives the relationship of early onset and employment in relation to those with late onset, all else equal. We explore alternate specifications of onset age. In model 2, we include a continuous variable for onset age in addition to an indicator for disability. This continuous onset variable measures the change

¹⁰ Unfortunately, we do not have enough information to estimate a separate equation predicting the probability of SSI/DI receipt that would allow us to at least partially correct for this issue.

in employment associated with a year increase in the onset age of disability.¹¹ A third specification of onset age allows for three separate onset age groups. Our late onset group includes a broad range of onset ages, from 22 to 51. To test if differences between onset in early adulthood and later career affect our results, we separate our late onset group into an indicator for mid-onset range (onset between ages 22 and 40) and an indicator for later onset (onset over age 40).

All models control for education, sex, race/ethnicity, and age. Unfortunately, we do not have a direct measure of years of work experience for this group. We anticipate having a severe disability reduces the probability of work. Including an indicator for severe disability helps separate out disability severity from the interpretation of the disability and onset results. We also include an indicator for whether the respondent has a mental health problem.

Finally, as discussed for the younger cohort, we are concerned about the disincentive effects of government disability receipt. We estimate our models of the probability of employment controlling for participation in SSI or SSDI. The same issues in interpreting the coefficient apply in this equation. The estimated coefficient may be capturing unmeasured characteristics of those who apply for disability benefits in addition to the work disincentives of the programs.

Early Onset of Disability and Education: A Young Cohort

In this section we examine the relationship between onset of a disability at an early age and the likelihood of completing secondary education with a young cohort (ages 22 – 35). We also examine whether those with early onset of disability are less likely to be employed than those without disabilities in this young cohort. In this young cohort sample, by definition, all those with disabilities have experienced early onset of disability.

Previous research has demonstrated that differences in demographic characteristics influence later education and work. As a precursor to comparisons between education and employment, we compare demographic characteristics of young people with and without disabilities. Our initial comparisons show that, for the most part, people with early onset of disability do not differ significantly from people without disabilities with one exception. We find that significantly more people with disabilities are black, non-Hispanic. However, people without disabilities are more likely to be Hispanic than people with disabilities so that the overall make-up of the white as compared to non-white population does not differ significantly between the two groups (table 1).

¹¹ A small percentage of our sample report an age range rather than a specific year of disability onset, 2 percent of our early onset group and 1 percent of our later onset group. For these individuals, we set the continuous onset age to the average onset age for the group, 8.7 for early onset and 38.6 for later onset.

Mental retardation (MR) is one of the most common diagnoses reported on the NHIS¹². The very nature of this condition may significantly affect whether or not a person is likely to attain significant levels of education. Not surprisingly, we find that people with disabilities are significantly more likely to indicate the presence of MR than people without disabilities (29.3 vs. 0.1% percent).

Living arrangements may affect sources of support available to household members. When comparing living arrangements between young people with and without disabilities, we find that those with disabilities are less likely to be living with a spouse than those without disabilities. Over 60 percent of young people without disabilities live with a spouse compared with only one-quarter of young cohort members with a disability. However, people with early onset of disability are as likely to be living with a relative as people without disabilities. That is because people with disabilities are significantly more likely to be living with a relative other than a spouse (59.1 vs. 24.7 percent). Of those early cohort members with a disability living with a relative other than a spouse, 65 percent report that relative is a parent.¹³ This may raise issues as a person ages since the relative living with them will also age and likely deteriorate in their ability to assist the person with a disability. The incidence of living alone or living with non-relatives is similar for the two groups of people.

Understanding a person's sources of support may provide information regarding a person's current employment status (table 2). For example, if a young person receives disability income, they may face steep benefit losses if they attempt to join the labor force. Not surprisingly, young people with disabilities are more likely to receive benefits from two government disability benefit programs – Supplemental Security Income (SSI) and Social Security Disability Insurance (SSDI).¹⁴ Previous research shows that once a person begins to receive benefits from a disability program they are unlikely to return to work (Rupp 1998). This may be because they are unable to return to work. In order to qualify for SSI and SSDI, a person must be found unable to do "any kind of substantial gainful work because of a physical or mental impairment that is expected to last at least 12 months or until death". In any case, benefit receipt does indicate a source of support that recipients take into account when making decisions regarding employment.

In addition, young people with disabilities have lower average family incomes than those without disabilities.¹⁵ This is true in absolute terms as well as when we control for poverty which takes family size into account. Young people with disabilities are more likely to be in households with income below the federal poverty level. This lower level

¹² It is likely that this condition is under-reported since data are gathered via self-reports.

¹³ Information on relatives in the house comes from Phase 2 of the NHIS-D. This information was collected approximately nine months after the initial interview when information on household members was first collected. Information is only available for people with disabilities who subsequently completed the phase 2 interview and answered this question. That accounts for two-thirds of our sample of early-onset adults.

¹⁴ Our definition does not overlap perfectly with the definition of people receiving SSI or DI. This is because our definition is based on functional limitations which differs from the definition used to qualify for SSI or DI.

¹⁵ This includes earnings of all family members as well as other types of income including disability benefits, pension income, and welfare.

of outside support again emphasizes the importance of understanding barriers to employment for people with disabilities.

How does disability affect education and employment?

By age 22, many people will have completed most of their formal education. If the onset of disability interrupts this critical process, young people with disabilities may find themselves significantly disadvantaged in the labor market during their first attempts to seek employment – which would likely have a carry-over effect to employment status in later years. Education can play a significant role in determining not only whether a person will be employed, but also the wages s/he will earn. If the early onset of disability interrupts this process, it may explain later, disparate employment rates and earnings for people with and without disabilities.

When asked about the highest level of school ever completed, young cohort members who experienced the early onset of disability report lower levels of education than their non-disabled peers. People with early disability onset are more likely to have stopped school prior to graduating from high school¹⁶ (33.3 percent) than people without a disability (12.7 percent) (table 3).

It is possible that there are differences in how very early onset of disability affects education relative to our measure of all onset before age 22. To examine this, we divide our group of young people with disabilities by whether or not the onset of disability is reported to occur prior to age five. For the very early onset group, throughout their entire formal schooling, they would have been affected by their disability. This means that although the severity of the disability might have changed over time, schooling would not be interrupted by the initial onset of disability. However, these young people must deal with their disability throughout their school years.¹⁷

Education levels of people with onset of disability at age five or before are less likely to graduate from high school than their peers with disability who become disabled after age 5 (table 5). This may be a product of more severe or different types of disabilities occurring at very young ages. For example, the very early onset group experience greater incidence of MR (56.3 vs. 7.5 percent), compared to those with onset between ages 5 and 22.

We expect that people with disabilities will be less likely to be employed, as a result of lower education levels. In order to understand the magnitude of this, we compare employment statistics for young people with and without a disability.

¹⁶ It is unclear from the survey documentation whether people who had earned a GED would be included in this category.

¹⁷ We compared demographic characteristics of young cohort members who experienced disability onset after age 5 and those who experienced disability onset at age 5 or younger. We find that people with onset at or before age 5 are more likely to be male (55.7 vs. 40 percent), have significantly lower family income (\$1,951 vs. \$3,165), and are more likely to receive SSI or DI (74.2 vs. 33.1 percent). No other characteristics were significantly different.

Young cohort members with disabilities are less likely to be employed than their peers without disability (Table 4). Strikingly, while four-fifths of young cohort members without disabilities were working, less than half that proportion of young cohort members with disabilities was working (38.1 percent). Of those who are working, people with disabilities are slightly less likely to be employed for the full-year than people without disabilities (78.4 vs. 87.3 percent). The largest employment difference appears between full-time and part-time work. Workers with disabilities are significantly more likely to work part-time (40.9 percent) than workers without disabilities (14.6 percent). This may reflect a preference for working fewer hours as a result of a person's disability or it may reflect the types of jobs people with disabilities are more likely to be hired to perform. People who work part-time are likely to have lower total earnings than people who work full-time which can be an issue in maintaining independence. The same is true for people who work for part of the year versus the full year.

Young people with disabilities receive significantly lower earnings than people without disabilities – partially as a result of the amount of work being performed (full-time vs. part-time). People in the young cohort without a disability who are working have average earnings of approximately \$1,800 while people in that cohort with disabilities who are working receive average monthly wages of approximately \$1,000. This large gap is cause for concern. Average hourly wages highlight the differences in income for people with and without disabilities that is not a product of the number of hours worked.

Interestingly, despite the education differences noted above, we did not find significant differences in employment levels for people who became disabled at age 5 or below vs. people who became disabled after age 5. This may be a product of the young cohort being in the very early parts of their careers. While entry-level jobs may not differ significantly in compensation at the beginning of employment, the career progressions resulting from the types of jobs people with very early onset and onset after age 5 have may differ. In addition, finding no significant differences in employment may be a product of the large portion of people who report having MR in the very young onset group. People with MR are more likely to be able to access a system of supports (including supported employment) after and during school that is not available to people with other conditions (Wittenburg, Golden and Fishman 2001).

Education and Employment: An Empirical Model

We now attempt to further isolate the effect of disability on high school completion and employment by controlling for the above differences in demographic characteristics and education (for employment) in a series of logistic regressions.

Education

We test several alternative specifications for modeling the probability of completing high school, varying the measure of disability. First, we examine a model that controls only for the presence of disability prior to age 22. We then specify disability in two additional formats. First, we control for whether or not the disability is severe.

Notably, we do not have data on whether the disability was severe at onset, only that the disability is severe at the time of interview. Because we are only analyzing a young cohort of people in this model, severity at the time of the survey may approximate severity during schooling. We do have data on the first reported onset of disability. In the third specification of the model, we control for whether the onset of disability occurred prior to age six. In a fourth specification of the model, we add an indicator for the presence of mental retardation.

The results from the initial model closely approximate the results we found prior to controlling for demographic characteristics (table 5). In the initial model, we estimate the probability that a person without a disability will complete high school is 24 percentage points higher than people with disabilities. This negative effect is present regardless of how we specify disability characteristics in the model. We also find that males, black non-Hispanic people and Hispanic people are less likely to complete high school compared to females, white non-Hispanic and non-Hispanic people. These demographic results are consistent across all model specifications.

Focusing on severity using the second specification of the model, we find that severity of disability is marginally significant ($p<0.10$). This suggests, all else equal, that a young person with a severe disability is 13 percentage points less likely to complete high school than a person with a less severe disability. This model represents the most straight-forward classification of disability status, accounting for severity and is our preferred model. There has been some concern by researchers using the NHIS that not all people with mental retardation actually report the presence of mental retardation when directly asked. This contributes to our preference for the second specification of the model.

When controlling for presence of mental retardation, we find that – all other characteristics held at the mean, the probability of completing high school is 12 percentage points higher for people without a disability than with a disability.¹⁸

The third specification adds a control whether or not onset occurred prior to age 5. Interestingly, although we might expect people who have been disabled since very young ages would be more disadvantaged than people who become disabled during schooling, we find the opposite. All else equal, a person with a non-severe disability who became disabled prior to age 5 is 18 percentage points more likely to complete high school than a person with a non-severe disability who became disabled between the ages of 6 and 22. And, for people with severe disabilities, an 18 percentage point difference between whether onset occurred on or before age 5 or after age 5 still exists.

The fourth specification of the model controls for disability more directly than the others by controlling for the presence of mental retardation – a condition that likely limits a person's ability to graduate from high school.¹⁹ This model provides strong support for

¹⁸ This variable is a self-report of having mental retardation, and may underreport the actual condition.

¹⁹ Clearly this is related to the severity of the condition, as there are certainly examples of people with mental retardation who have completed high school.

the theory that an early onset of disability results in the reduced investment in human capital – even after controlling for severity and the presence of mental retardation. In this case, a person with a disability, all else equal, is 12 percentage points less likely to complete high school than a person without a disability.

We next analyze the effect that education and other factors have on employment. Knowing that people with disabilities have lower education levels, controlling for education and disability status helps to determine whether disability has an independent effect on employment. If so, people with disabilities may be considered doubly disadvantaged in the labor market.

Employment

We estimate the relationship of early onset of disability to employment, all else equal. Again, we specify the models in the same format as above, except the outcome variable is employment. Naturally, we include an indicator for whether or not a person has completed high school. This shows the additional effect disability has on employment, though the above shows us that there are negative effects in the education variable as well. Regardless of the model specification used, we find that young people with disabilities are significantly less likely to be employed than young people without disabilities.

Our estimates are conservative to some degree. There may be some people in the young cohort, particularly at the lower end of the age range, that are still in school but are likely to complete some sort of post-secondary school in the near future. Unfortunately, the data do not allow us to control for people still in school.

Program administrators may be interested in developing ways to increase the number of people with early onset of disability who complete high school in order to assist them in joining the labor market. A strong body of literature suggests that higher levels of education, even when there is a break between initial education and later education results in greater employment rates (Leigh 1997; Light 1995).

We calculate the difference in employment for a person with a disability who has completed high school and a person with a disability who has not completed high school. We estimate that, all else equal, employment levels would be 23 percentage points higher for people with disabilities if they completed high school. Because our sample includes only people ages 22 – 35, it is likely that any education received was received continuously, without interruption. Some studies do suggest that at least initially, increased employment effects for people are dampened when the education is discontinuous, though it is still positive (Light 1995). Thus, employment rates may not be raised as much for people who have been away from formal school for a period of time. However, for the young cohort, time between last attending school and any subsequent return to school would necessarily be limited, given the relatively young ages.

In the alternate specifications of the model where we control for severity of disability, whether onset occurred prior to age 5, and the presence of mental retardation we find similar results. In all models, a severe disability seems to significantly dampen employment prospects, beyond the negative effect that occurs when controlling only for the presence of a disability. A person with a non-severe disability is more than twice as likely as a person with a severe disability to be employed, all else equal.

Interestingly, when we control for onset of disability prior to age 5, we find that it is not a significant factor in predicting employment, all else equal. There is some evidence that a person with disability onset prior to age five is more likely to be employed than someone who experiences disability prior to age 22 but after age 5, but it is not significant.

We include a fifth model specification for estimating employment that includes receipt of disability benefits. Not surprisingly, when we control for receipt of SSI or DI, the effect of having a disability is reduced, although it is still significant and negative. All else equal, when controlling for SSI or DI receipt along with demographic characteristics and education levels, people without a disability are 8 percentage points more likely to be employed than people with a disability.

Again, because there are measurement issues surrounding the reporting of mental retardation, and because adding early onset of disability to the model does not increase the predictive power of the model significantly, we prefer the second specification of the model as the most straight-forward estimation of employment for people with early onset of disability. As discussed earlier, receipt of SSI or DI may be an additional indicator for severity of disability. Because it is unclear exactly what this variable picks up, we further analyze the second model.

We attempt to understand the effect of education on employment by holding all characteristics of people with disabilities at their mean – except for education, which we hold at the mean for people without disabilities. We then estimate the probability that a person will be working if they are disabled (holding characteristics for the mean of the group of people with disabilities) and the probability that a person will be working if they are not disabled (holding characteristics at the mean of the group of people without disabilities). Doing this allows us to estimate the portion of the variance in employment of people with and without disabilities attributable not just to differences in their characteristics, but differences in education. We estimate that 13 percent of the difference in employment is attributable to differences in education. The remainder of the variance is attributable to the presence of disability and all other characteristics.

Discussion

Lower education levels for people with disabilities puts them at a disadvantage throughout their adult lives in terms of paid employment. The independent effect that early onset of disability exerts on education means that disability may be acting in two ways when analyzing employment later in life. The early onset of disability appears to

disadvantage people with disabilities because they are less likely to complete high school. But second, there is an independent effect on later employment of having a disability.

Lower education levels may be a product of several environmental factors, including poverty and parentel education levels. It is difficult to know whether disability reduces educational attainment or these environmental factors reduce educational attainment, as well as increase the likelihood for disability. Unfortunately, it is very rare to have data on these factors at the time of early disability onset for a group of adults.

The strong negative correlation between disability and employment for people in the young cohort - regardless of how disability is taken into account – indicates that policy makers may wish to focus some programs for improving employment prospects on this fairly narrow group of people. What is not known at this point is whether or not different types of interventions might be appropriate based on the timing of disability. While we present strong evidence in the section above that young cohort members with disability would benefit from programs aimed at increasing human capital investment, we do not know whether these same types of support would be appropriate for people who experience the late onset of disability.

Disability Onset and Employment: Older Cohort

Education levels continue to play a critical role in employment and earnings throughout a person's life. We see that early onset of disability is associated with lower levels of educational completion. This lower level of education could continue to have a negative affect on employment many years later. We also find that early onset of disability had an additional direct negative association with employment for this younger group. This section examines the extent to which onset of a disability at an early age continues to be associated with lower employment in later life, both through education and directly. We also examine how employment outcomes differ between those with early onset and those with later onset of disability.

Our expectation is that those with early onset of disability will continue to have lower employment rates in this older cohort relative to those without disabilities. Some of this lower employment will be due to lower educational levels and some will be the direct impact of disability on work.

How early onset of disability affects employment in this age group relative to those with later onset is less clear. One possibility is that since early onset leads to less work early in life, those with early onset in an older age group will have less work experience than those with later onset. This lower experience will tend to lower employment rates for those with early onset relative to those with later onset. Another possibility, however, is that living with a disability for a longer time period increases the potential for becoming familiar with work accommodations or even choosing job types or career paths that are more accommodating. Those experiencing onset of disability later in life may have more difficulty transitioning to new types of work or to using accommodations. This would suggest higher employment for those with early onset relative to late onset, all else equal.

Descriptive Differences

We first examine the differences between those with early onset of disability, late onset of disability, and no disability considering demographics, income, education, and employment.

There are several differences in the demographic characteristics of the early and late onset groups. Those with late onset are more likely to be nonwhite, female, older, and married than those with early onset. The race/ethnicity of those in the early onset group is similar to the distribution for those without disability (table 7).²⁰ However, those with late onset are more likely to not be white, non-Hispanic. Of the late onset group, 15.3 percent are black, 8.7 percent are Hispanic, and 2.8 percent are another race or

²⁰ Tests of statistical significance are reported separately in the tables for the early onset group relative to those without disabilities, and for the early onset group relative to those with late onset. Differences discussed are statistically significant unless otherwise stated.

ethnicity. This compares to the early onset group, of which 13.8 percent are black, 6.5 percent are Hispanic, and 1.8 percent are of another race or ethnicity. This could reflect differential factors influencing early and late disability, such as differences by race/ethnicity in type of work that might impact late onset but not early onset of disability.

The early onset group is about half female and half male, similar to the younger cohort of persons with early onset, and similar to those without disabilities in this age group. However, of those with a late onset of disability, 60.5 percent are female. The reason for this difference is unclear. It is unlikely to result from large sex differences in mortality at this age, and we would expect more men to experience work-related disabilities.

Within this somewhat narrow age cohort, as expected, those with late onset tend to be older than those with early onset. This results from the increased likelihood of disability onset as age increases. The age distribution for those with early onset of disability is similar to the age distribution of those without disability.

The living arrangements of the early and late cohorts and those without disabilities differ significantly. Persons who had an early onset of disability are significantly less likely to be living with a spouse (40.8 percent) than those without disabilities (76.5 percent) or those with late onset of disability (61.5). They are more likely to be living with a non-spouse relative than either of these groups, 38.9 percent compared to 11.6 percent and 17.7 percent, respectively. These results suggest that persons with disabilities are less likely to marry after the onset of disability. However, they also show that those with early onset are about as likely to live with someone (a spouse or other relative) as are those with late onset. Living with others (spouse or relative) may provide increased economic stability and support in employment. About a fifth of both groups live alone compared to only a tenth of those without disabilities.

Education of those with early onset is lower than those without disabilities, but similar to those with late onset. Those with early onset of disability are significantly less likely to have completed high school than those without a disability, 36.2 percent v. 12.9 percent. The early onset group is also significantly less likely to have graduated from college, 8.8 percent compared with 29.8 percent. The only significant difference in education level between those in the early and late onset group is that fewer persons with early onset are college graduates (8.8 percent v. 13.7 percent).

There are no significant differences between the early and late onset groups in the percent with a severe disability (measured by severe activity limitations) and with mental health problems. Approximately half of both groups have a severe disability and about a fifth have mental health problems. Both of these are likely to have a negative impact on the probability of employment.

Family income is significantly lower among those with early onset of disability compared to those without disability. Average monthly family income is \$2,366 for those

with early onset compared to \$4,579 for those without disability (table 8). Family income is also low for those with late onset, \$2,632. These relatively low family income measures likely reflect the greater number of persons living alone among those with disabilities. However, the high rate of poverty among those with disabilities, even though this measure takes into account family size, suggests the families of those with disabilities face much worse economic situations. Of those with early onset, 20.9 percent are living in poverty and of those with late onset 28.1 percent are living in poverty, compared with 8.0 percent of those without a disability.

Cash assistance from the SSI and SSDI programs is an important source of income for those with disabilities. In this age group, more than half, 56.6 percent, of those with early onset receive benefits from either of these programs. A significantly lower 36.8 percent of those with late onset receive these benefits. Lower receipt of benefits in the late onset group might reflect the availability of alternate sources of income such as workers compensation or private disability benefits through an employer. There may also be differences in eligibility across the two groups. Fewer in the late onset group had severe disabilities according to our measure. Although we might think fewer in the early onset group would have the work experience to qualify for SSDI, a significantly higher percent of those with early onset receive these benefits, 45.0 percent v. 26.2 percent. For the large numbers of person receiving these benefits in both groups, participation in SSI or SSDI is likely a serious disincentive to work.

Employment of those with early onset is significantly less than those without disabilities, but not substantially different from those with late onset of disability. Of those with early onset, 32.6 percent worked at all in the two weeks prior to the interview compared to 84.3 percent of those without a disability (table 9). Only 31.5 percent of those with late onset were working. For those who are working, the vast majority worked all months of the previous year, although a slightly greater percent of those with early onset worked full-year than those with late onset (91.7 percent v. 85.9 percent). However, those with early onset are less likely to be working full-time than those with later onset (67.8 percent v. 74.9 percent).

Persons who had early onset of disability earned lower hourly wages than those without disability and those with late onset of disability. Among workers, the average hourly wage for those with early onset is \$7.98, significantly less than \$13.93 for workers without disabilities and \$12.78 for those with late onset.²¹ Median hourly wages are more similar, \$7.50 for those with early onset and \$8.65 for those with late onset. Median hourly wage for those without disabilities is \$11.54. In addition, average monthly earnings are lower for workers who had an early onset of disability, \$1,323, than those with a late onset, \$2,086. This difference reflects both lower hours and hourly wages of those with early onset. The relatively low levels of average monthly earnings for all persons with disabilities in this age group reflect their low rates of employment as well.

²¹ The higher mean hourly wages of those with later disability onset is due to a relatively small number of workers with high wages.

Relating Disability Onset and Employment

We now turn to the results of our estimation of the connection between early onset and employment, and the difference in outcomes between those with early and late onset of disability.

Results from our first logit model (table 10) show that those with early onset of disability are significantly less likely to be employed than those without disability, even after controlling for education and other factors. The estimated logit coefficient suggests the probability of work among those with early onset of disability is 42 percentage points lower than the probability of employment for those without disabilities.²² However, we find no significant difference between the probability of employment for those with early onset and those with late onset of disability.

Severity of disability is associated with a large additional reduction in employment. Calculating employment for those in the early onset group and with a severe disability is 26 percentage points lower than for those in the early onset group but without a severe disability, all else equal.

The other control variable results are as expected. Having completed high school, had some college, or completed college are all significantly associated with higher levels of employment relative to not having completed high school. Men are more likely to be employed than women and black and Hispanic persons are less likely to be employed. Older individuals in our sample are less likely to be employed, possibly reflecting an increased likelihood of retirement as they approach age 55. Our separate indicator for having a mental health problem is significantly related to lower rates of employment, over and above our measures of disability and severity. This suggests that the subgroup with these conditions have significant additional problems with employment.

Alternate Measures of Onset Age. It is possible that the lack of difference between early and late onset of disability in relation to employment is due to the broad range of onset ages in our late disability indicator, from onset at 23 to onset at 51. We test this in two ways, by including a continuous measure of onset (Model 2) and including three indicators for early, mid, and later onset (Model 3). Table 10 reports these results. In the continuous onset age model, we find no significantly different impact for an increase in a year of onset age, over and above the average impact of disability. The onset estimate is equivalent to less than half a percentage point decrease in employment for every year later of onset. All other estimates remain approximately the same.

The third model again shows that each range of onset is associated with significantly lower probabilities of work relative to those without disabilities. However,

²² Probabilities throughout this section are calculated at the mean of all characteristics other than severity. We calculate employment rates at the average probability of severity for those with disability unless otherwise stated.

these coefficients are not significantly different from one another. This also indicates there is no estimated difference in employment by onset age among those with disabilities. Again, the influence of other factors remains the same as in our first model.

Receipt of Government Benefits. Because so many persons with disabilities in both the early and late onset group receive government disability benefits and we know participation in these programs is a disincentive to work, we also re-estimate each of the three previous models including an indicator for receipt of either SSI or SSDI benefits. These are shown as models 4 through 6 in table 10. As expected, recipients of SSI or DI benefits are significantly less likely to work than non-recipients. Our estimates suggest that those receiving these benefits are 70 percentage points less likely to work, all else equal.

Inclusion of receipt of disability benefits also reduces the relationship of early disability onset to employment relative to those without disabilities. The difference remains statistically significant. These results mean that a person with early onset, controlling for receipt of SSI or DI, is 8 percentage points less likely to work than a person without disabilities. This is compared to a 42 percentage point difference without controlling for benefit receipt. These results suggest that a large proportion, though not all, of the difference in employment rates between persons with early onset and persons without disability is connected to benefit receipt.

In model 4, employment rates for early and late onset persons are significantly different, controlling for benefit receipt. We estimate that persons with early onset of disability are 16 percentage points more likely to work than those with later onset. Similar results are found for our other specifications for onset (shown in models 5 and 6). Onset age is significantly negatively related to employment (Model 5), meaning that those with later onset ages have decreasing probability of employment. In Model 6, we see the same result. Early onset is associated with a significantly higher probability of employment relative to mid- and later onset, controlling for SSI or SSDI receipt. There is no significant difference in employment rates of those with mid-range and later onset of disability.

It is important to remember that direct interpretation of the estimated relationship between SSI or SSDI receipt and employment is unclear in this specification. In part the estimated negative relationship reflects the disincentives to work for recipients due to loss of benefits. However, it also likely reflects unmeasured characteristics of those who receive benefits. The decision to apply for benefits in the first place may result from the respondent's belief that they have a low likelihood of being able to work. Thus our estimate also captures the lower "ability" or "desire" to work of those who receive benefits. Our indicator for severity addresses this concern in part, but it is likely the SSI/DI indicator still reflects these unmeasured factors leading to benefit application.

Discussion

The results in this section suggest that those with an early onset of disability have a significantly lower probability of work relative to those without a disability, but that this association mainly is due to disability benefit receipt. After controlling for receipt of disability benefits, those with early onset of disability have similar employment rates to those without disabilities, all else equal. In part this reflects that those who decide to apply for and who are approved for disability benefits are different than those who do not receive benefits in ways we have not controlled for. We control for severity of disability, but cannot control for differences in individual desire to work and ability to work.

In addition, because educational attainment is lower for those with early onset ages than those without disability in this older cohort, average employment rates are still lower than they would be if education levels were comparable.²³ In fact, if persons with early onset of disability had the education levels on average of persons without disabilities, their employment rates would be about 6 percentage points higher.

Our results on the differences between those with early and late onset tell a somewhat more complex story. In our descriptive results, we see that although there are some demographic differences between the two groups, education levels and employment levels are remarkably similar. Receipt of SSI and SSDI benefits is somewhat higher among the early onset group. When controlling for demographics, education, disability severity and benefit receipt, we find that those with early onset of disability tend to have higher employment rates relative to those with late onset of disabilities.

These results are consistent with the theory that those who have had early disability onset have had more time to find and become accustomed to work accommodations or have chosen work paths that are accommodating to their particular disability. Those with later onset of disability, even though it has been at least three years after onset, may be less able to make the transition to other work, to find accommodations, or to be given accommodations by their employer. At this point in their careers and at higher wage rates than young workers, certain types of accommodations may be more costly for employers. In addition, those with late onset of disability may have greater access to other sources of income that we cannot measure in these data, such as private disability insurance, workers compensation, or retirement savings. Those with early onset are less likely to qualify for work-based disability compensation since their disability is likely to be related to the job. It is also possible that those who experienced early onset may have worked at lower wages or earnings and accumulated less savings than those with later onset. Controlling for disability benefits is important to these results, since a higher proportion of early onset group receive these benefits and their receipt is associated with much lower employment.

Conclusion

²³ Estimation of an equation on the probability of high school completion for this older age cohort finds that early onset of disability is negatively associated with high school completion relative to those without disabilities in this older group as well.

This paper studies the extent to which onset of a disability at an early age (under 22 years of age) has a negative impact on education and employment.

We find that in a young cohort of persons (ages 22 to 35), those who had an early onset of disability have a significantly lower likelihood of completing high school than people without disabilities, even after controlling for severity of disability. In addition, young people with early onset have a lower probability of employment than their non-disabled peers. This results from both lower levels of high school completion and a direct impact of disability on work.

In an older cohort of persons (ages 44 to 54), we find that disability is associated with a lower probability of employment relative to those without disabilities, regardless of onset age. Because in this older cohort educational attainment is lower for those with early onset ages than those without disability, average employment rates for those with early onset are still lower than they would be if education levels were comparable.

These results suggest the importance of trying to increase educational attainment for those with early onset of disability. It is possible that some of the connection between early disability onset and lower high school completion rates reflects ability to attain a certain level of education. Although we try to account for this through controls for severity and having mental retardation, this still could be true. However, the importance of education for employment for this young cohort suggests increased scrutiny on ways to increase high school completion may have positive impacts on work. Increases in employment in the early years of a young persons working life means greater accumulation of work experience that will likely impact employment in later years.

Increased educational levels not only can increase employment prospects, but can also lead to decreased dependence on disability benefits. As we have shown for both the younger and older cohort, those who receive these benefits have a much lower probability of working. If prospects for employment are improved, this may change the balance for those deciding on whether to participate in these programs.

Finally, we also find in our older cohort, that the employment of those with early onset of disability is significantly higher than the employment of those with later onset of disability, after controlling for disability benefit receipt and other factors. These results suggest that the services required of those with early and later onset may also be different. The better employment prospects of those with early onset ages could reflect that they have had more time to accommodate their disability in the labor market through workplace accommodations or support arrangements. Those with onset of disability at later ages may find it more difficult to continue in their pre-disability work or to find new work. However, in this older age group, it is also true that those with earlier onset are more likely to receive disability benefits than those with later onset. It may be true that the more traditional return-to-work and work incentive approaches are best targeted to those with later disability onset. Programs that try to intervene at early ages to improve educational completion may prove to be most helpful for those with early onset of disability.

Appendix: Sensitivity Analysis for Definition of Onset

We define onset of disability as the age when a survey respondent reports first having trouble with a specific ADL, IADL, or functional activity used in our definition.²⁴ For those with difficulty or inability performing multiple activities, we define age of onset as the earliest age of limitation onset reported among these activities.

In our sample of persons with disabilities, 73 percent report multiple limitations including 20 percent reporting 7 or more. Using the earliest onset age reported among all limitations, we find that 780 persons ages 22 to 64 have an onset of a disabling limitation before age 22, 15.5 percent of our sample with disabilities (table A1). Only 1.1 percent of the population meeting our definition of disability did not report any information on age of limitation onset. Among those with early onset of disability, 41.0 percent report onset of disability at birth.

The specific activity limitation associated with the youngest onset age could be any of the 20 limitations we include in our definition of disability. Although limitation in an ADL can be thought of as the most severe limitation across all activities, it is not necessarily true that these limitations are associated with the earliest onset age. In fact, the opposite can be true, where the earliest onset is a limitation in a less basic activity. Table A2 shows the activity limitation that is the “source” of the youngest onset age for the individual, grouped by type of limitation, either ADL, IADL, or functional limitation. About 20 percent of our total sample has an ADL associated with their youngest age of onset. An additional 47 percent have an IADL as the source of their youngest onset age and the remaining 32 percent have a functional limitation as the source. The distribution of earliest onset limitation by types is similar for our early onset group.

Alternate Onset Definitions For Those with Multiple Limitations

Most people with at least one ADL limitation are reporting this as their earliest onset across all of their limitations. In our sample, 23 percent have at least one ADL limitation and 20 percent report an ADL limitation as their earliest onset age. However, on closer inspection of the data, we find that many persons with multiple limitations in our sample report the same onset age across all limitations. This means the specific way we account for earliest onset is immaterial for many with multiple limitations.

Of those with more than one limitation, approximately half report the same age of onset for all of their limitations. The percent reporting the same age across all limitations declines as the number of limitations increases. These results are generally true for those reporting onset ages above 22 as well as below 22. For those with earliest onset under age 22, 40 percent report the same age for all limitations. For those with earliest onset after age 22, about 52 percent report the same age for all limitations. Reporting the same onset age across limitations could be an artifact of the repetitive structure of the survey questions or it could reflect imperfect recall. However, those with a greater difference

²⁴ Only if a functional limitation meets the severity level outlined in the definition will an associated onset age be considered.

between their age at interview and the earliest age of onset are not more likely to give the same age across multiple limitations.

To test the importance of our treatment of those with multiple limitations we create an alternate measure of onset. In this measure, we define onset age for those with multiple limitations as onset of the most severe limitation type. We consider ADLs to be most severe, followed by IADLs, and finally functional limitations. We do not differentiate between the limitations within each category. This alternate definition has little impact on the percent of persons with onset younger than age 22. The second column or table A1 shows that by this measure, 13.9 percent of our total sample report onset before age 22. Among those reporting onset before age 22, the percentage reporting disability at birth is slightly lower, 36.5 percent compared with 41.0 percent. Given the limited differences in using this measure and the earliest onset measure, we choose to use the measure of the youngest onset age among all limitations.

REFERENCES

Benitez-Silva, Hugo, Moshe Buchinsky, Hiu Man Chan, Sofia Cheidvasser, and John Rust. 1999. An Empirical Analysis of the Social Security Disability Application, Appeal, and Award Process. *Labour Economics* 6: 147-78.

Blackorby, J., and W. Wagner. 1996. Longitudinal postschool outcomes of youth with disabilities: Findings from the national longitudinal transition survey. *Exceptional Children* 62, no. 5: 399-413.

Bound, John, and Richard Burkhauser. 1999. Econoomic Analysis of Transfer Programs Targeted on People with Disabilities. In *Handbook of Labor Economics*, edited by Orley Ashenfelter and David Card, 3417-520. North-Holland: Elsevier Press.

Boyle, CA, P Decoufle, and Yeargin-Allsopp M. 1994. Prevalence and Health Impact of Developmental Disabilities in US children. *Pediatrics* 93, no. 3, March: 399-403.

Burkhauser, Richard, Mary Daly, and Andrew Houtenville. 2001. How Working Age People with Disabilities Fared Over the Business Cycle. In *Ensuring Health and Income Security for and Aging Workforce*, edited by Budetti, P; Burkhauser, R.V.; Gregory, J.; Hunt, A. Kalamazoo, MI: Upjohn Institute for Employment Research.

Burkhauser, Richard, Kenneth Couch, and John Phillips. 1996. Who Takes Early Social Security Benefits: The Economic and Health Characteristics of Early Beneficiaries. *The Gerontologist* 36, no. 6: 789-99.

Daly, Mary, and John Bound. 1996. Employment and Economic Well-Being Following the Onset of a Disability. In *Disability, Work, and Cash Benefits*, edited by et. al. Jerry Mashaw. Kalamazoo, MI: Upjohn Institute for Employment Research.

DeLoach, C.P. 1992. Career Outcomes for College Graduates with Severe Physical and Sensory Disabilities. *Journal of Rehabilitation* 58, no. 1: 57-63.

Kane, Thomas. 1999. *The Price of Admission*. Washington, DC: Brookings Institution Press.

Kregel, John. 2001. Promoting Employment Opportunities For Individuals With Mild Cognitive Limitations: A Time For Reform. In *The Forgotten Generation: The Status and Challenges of Adults with Mild Cognitive Limitations*, edited by Alexander Tymchuk, K. Charlie Lakin, and Ruth Luckasson, 87. Baltimore, MD: Paul H. Brookes.

Laplante, Mitchell. 1996. The Demographics of Disability. *The Millbank Quarterly* 69, Suppl 1/2: 55-77.

Leigh, Duane E. and Gill, Andrew M. 1997. Labor Market Returns to Community Colleges: Evidence for Returning Adults. *The Journal of Human Resources* 32, no. 2: 332-53.

Light, Audrey. 1995. The Effects of Interrupted Schooling on Wages. *The Journal of Human Resources* 30, no. 3: 472-502.

—. 1995. The Effects of Interrupted Schooling on Wages. *Journal of Human Resources* 30, no. 3: 472-502.

Loprest, Pamela, and Elaine Maag. 2003. Issues in Job Search and Work Accommodation. *Research in Social Science and Disability* 3: 87-108.

Rupp, Kalman & Scott, Charles. 1998. Determinants of Duration on the Disability Rolls and Program Trends. In *Growth in Disability Benefits: Explanations and Policy Implications*, edited by K. and Stapleton Rupp, D, 139-75. Kalamazoo, MI: The W. E. Upjohn Institute for Employment Research.

Schur, Lisa. 2002. The Difference a Job Makes: The Effects of Employment among People with Disabilities. *Journal of Economic Issues* XXXVI, no. 2, June: 339 - 347.

Stapleton, David, K Coleman, K Dietrich, and G Livermore. 1998. Econometric Analyses of DI and SSI Application and Award Growth. In *Growth in Income Entitlement Benefits for Disability: Explanations and Policy Implications*, edited by Kalman Rupp and David Stapleton, Chapter 2. Michigan: The Upjohn Institute.

Stapleton, David, David Wittenburg, Michael Fishman, and Gina Livermore. 2002. Transitions from AFDC to SSI Prior to Welfare Reform. *Social Security Bulletin* 64, no. 1.

Stoddard, Lisa, Lita Jans, Joan M. Ripple, and Lewis Kraus. 1998. *Chartbook on Work and Disability in the United States, 1998*. Washington, DC: U.S. Department of Education, National Institute on Disability and Rehabilitation Research.

National Center for Education Statistics, Office of Education Research and Improvement, U.S. Department of Education, Employment of Young Adults, by Educational Attainment 2000

U.S. Department of Health and Human Services, Public Health Service. 1999. *Current Estimates From the National Health Interview Survey, 1996*. Vital and Health Statistics, ed. Centers for Disease Control and Prevention, vol. 10, no. 193. Hyattsville, Maryland: U.S. Department of Health and Human Services.

Wittenburg, David, Thomas Golden, and Michael Fishman. 2001. Transition Options for Youth with Disabilities: An Overview of the Programs and Policies that Affect

the Transition from School. *Journal of Vocational Rehabilitation* 17 (October): 195-206.

Wittenburg, David, and Elaine Maag. 2002. School to Where? A Literature Review of Economic Outcomes of Youth with Disabilities. *Journal of Vocational Rehabilitation* 17, no. 4: 265-80.

Ann Elwan, Human Development Network, Social Protection Unit, World Bank, Discussion Paper No. 9932, Poverty and Disability: A Survey of the Literature (1999)

Yelin, Edward, and Laura Trupin. 2002. Persons With Disabilities and Demands of the Contemporary Labor Market. In *The Dynamics of Disability: Measuring and Monitoring Disability for Social Security Programs*, eds. G. Wunderlich, D. Rice, and N. Amado. Washington, DC: National Academy Press.

Table 1. Demographic characteristics of persons
by Disability Status: Young Cohort

	Disability	No Disability
Race		
White, Non-Hispanic	69.0	69.9
Black, Non-Hispanic	19.1*	12.7
Hispanic	7.8**	12.3
Other	4.1	5.1
Sex		
Male	47.0	49.2
Age		
22 – 26	37.9	33.3
27 – 31	32.3	35.9
32 – 35	29.8	30.8
Living Arrangement		
Living with spouse	25.2**	60.9
Living with non-spouse relative	59.1**	24.7
Living alone	11.5	10.1
Living with non-relative	4.1	4.3
Mental retardation	29.3**	0.1

n=41,128

** = p<0.01; * = p<0.05 indicates difference between those with disability and without disability.

Table 2. Family and Outside Supports
by Disability Status: Young Cohort

	Disability	No Disability
Average Monthly Family Income (\$)	2,494**	3,306
Family Income Relative to Poverty (%)		
< 100%	30.0**	15.8
100% - 200%	27.3*	21.7
200%+	42.8**	62.5
Own SSI	38.2**	0.8
Own SSDI	23.8**	0.5
Either SSI or DI	51.5**	1.2

n=41,128

** = p<0.01; *=p<0.05 indicates difference between those with disability and without disability.

Table 3. Education characteristics
by Disability Status: Young Cohort

	<i>With Disability</i>			No Disability
	Disability	Onset <=5	Onset > 5	
Education				
< High school	33.3**	42.0**	26.7	12.7
High school graduate	47.1**	46.8	47.4	36.9
Some college	11.8**	4.5**	17.3	25.6
College graduate / post-college	7.8**	6.7	8.6	24.8

n=41,128

**=p<.01, *=p<.05 in first column indicates significance between those with and without disability. In the second column it indicates significance between onset<=5 and onset>5.

Table 4. Employment Characteristics
by Disability Status: Young Cohort

Employment Characteristic	Disability	No Disability
Employed	38.1**	80.7
Months worked ^a		
<6	7.1	3.7
6 – 11	14.5	8.9
12	78.4**	87.3
Hours worked ^a		
<20	12.0**	3.4
20 – 34	28.9**	11.2
35+	59.1**	85.4
Average Hourly Wage ^a (\$)	7.45**	10.25
Average Monthly Earnings ^a (\$)		
All	404**	1468
Workers	1027**	1802

n=41,128

** = p<0.01; *=p<0.05 indicates difference between those with disability and without disability.

^aCalculated only for employed persons in category.

Table 5. Logistic Regression Results for Probability of Completing High School:
Young Cohort

	Model 1 (SE)	Model 2 (SE)	Model 3 (SE)	Model 4 (SE)
Disability	-1.44** (0.14)	-1.21** (0.18)	-2.41** (0.53)	-0.81** (0.21)
Severe		-0.54^ (0.29)	-0.39 (0.30)	-0.45 (0.30)
Onset < 5 years old			0.74** (0.29)	
Presence of mental retardation				-1.36 (0.28)
Male	-0.14** (0.03)	-0.14** (0.03)	-0.14** (0.03)	-0.14** (0.03)
Black, Non-Hispanic	-0.51** (0.05)	-0.51** (0.05)	-0.51** (0.05)	-0.51** (0.05)
Hispanic	-1.69** (0.04)	-1.69** (0.04)	-1.69** (0.04)	-1.69** (0.04)
Constant	2.34** (0.03)	2.34** (0.03)	2.34** (0.03)	2.34** (0.03)

n=41,128

** = p<0.01; * = p<0.05; ^ = p<0.10

Table 6. Logistic Regression Results for Probability of Being Employed:
Young Cohort

	Model 1 (SE)	Model 2 (SE)	Model 3 (SE)	Model 4 (SE)	Model 5 (SE)
Disability	-1.85** (0.15)	-1.48** (0.19)	-2.10** (0.48)	-1.30** (0.21)	-0.49* (0.21)
Severe		-0.95** (0.31)	-0.88** (0.32)	-0.93** (0.32)	-0.75* (0.39)
Onset < 5 years old			0.38 (0.30)		
Presence of mental retardation				-0.71** (0.25)	
Receipt of SSI or DI					-2.52** (0.12)
Completed high school	1.10** (0.04)	1.11** (0.04)	1.11** (0.04)	1.10** (0.04)	1.04** (0.04)
Male	1.24** (0.04)	1.18** (0.04)	1.24** (0.03)	1.24** (0.04)	1.29** (0.04)
Black, Non-Hispanic	-0.42** (0.04)	-0.42** (0.04)	-0.42** (0.04)	-0.42** (0.04)	-0.38** (0.04)
Hispanic	-0.29** (0.04)	-0.29** (0.04)	-0.29** (0.04)	-0.29** (0.04)	-0.33** (0.04)
Constant	0.11** (0.04)	0.12** (0.02)	0.12** (0.02)	0.12** (0.11)	-0.19** (0.04)

n=41,128

** = p<0.01; * = p<0.05

Table 7. Demographic Characteristics
by Disability Status and Onset Age: Older Cohort

	With Disability		Without Disability
	Early Onset	Late Onset	
Race			
White, Non-Hispanic	78.0	73.2	78.6
Black, Non-Hispanic	13.8	15.3	9.8
Hispanic	6.5	8.7	7.0
Other	1.8	2.8	0.2
Sex			
Female	48.6	60.5**	50.7
Male	51.4	39.5**	49.3
Age			
44-49	65.7	49.2**	61.8
50-54	34.2	50.8**	38.2
Living Arrangement			
Living with spouse	40.8	61.5**	76.5**
Living with non-spouse relative	38.9	17.7**	11.6**
Living alone	19.2	17.6	10.8*
Living with non- relative	1.0	1.6	1.1
Education (%)			
< High school	36.2	33.2	12.9**
High school graduate	36.9	34.4	35.9
Some college	18.0	18.6	21.4
College graduate/post- college	8.8	13.7*	29.8**
Severe disability	51.4	43.7	--
Mental health problem	22.7	19.6	2.3**

n=26,078

**=p<.01, *=p<.05 in second column indicate significance between early and late onset, in third column indicate significance between early onset and no disability.

Table 8. Income and Benefit Receipt
by Disability Status and Onset: Older Cohort

	With Disability		Without
	Early Onset	Late Onset	Disability
Average Monthly Family Income (\$)			
Mean	2,366	2,632	4,579**
Median	2,730	3,199	4,089
Family Income Relative to Poverty (%)			
<100%	20.9	28.1*	8.0**
100%-200%	31.6	24.9	13.5**
200%+	47.4	47.1	78.5**
Own SSI (%)	23.8	14.2**	0.9**
Own SSDI (%)	45.0	26.2**	1.2**
Either SSI or DI (%)	56.6	36.8**	1.9**

n=26,078

**=p<.01, *=p<.05 in second column indicate significance between early and late onset, in third column indicate significance between early onset and no disability.

Table 9. Employment Characteristics
by Disability Status and Onset: Older Cohort

	With Disability		Without Disability
	Early Onset	Late Onset	
Employed	32.6	31.5	84.3**
Months worked in previous year ^a			
<6	1.2	4.3	1.5
6 – 11	7.1	9.9	4.3
12	91.7	85.9	94.2
Hours worked per week ^a			
<20	8.0	5.8	2.6*
20 – 34	24.1	19.3	8.8**
35+	67.8	74.9	88.5**
Average Hourly Wage ^a (\$)			
Mean	7.98	12.78**	13.93**
Median	7.50	8.65	11.54
Average Monthly Earnings (\$)			
All - mean	432	663*	2,146**
Workers – mean	1,323	2,086**	2,530**
Workers – median	1,200	1,400	2,000

n=26,078

**=p<.01, *=p<.05 in second column indicate significance between early and late onset, in third column indicate significance between early onset and no disability.

^a Calculated only for employed persons in each category. Average hourly wage excludes 2.7 percent of working respondents who do not report hours or are self-employed and do not report wages.

Table 10: Logit Model Regressions of the Probability of Work:
Older Cohort

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)
Early Onset, Age < 22	-1.597** (0.217)		-1.553** (0.217)	-0.546* (0.304)		-0.473* (0.304)
Late Onset, Age >22	-1.719** (0.116)			-1.306** (0.133)		
Disability		-1.618** (0.218)			-0.499 (0.329)	
Age of Onset ^a		-0.002 (0.006)			-.0201* (0.009)	
Mid-Onset, age 23-39			-1.734** (0.142)			-1.311** (0.168)
Later Onset, age 40+			-1.700** (0.137)			-1.324** (0.139)
SSI or DI receipt				-3.527** (0.152)	-3.531** (0.153)	-3.536** (0.152)
Severe disability	-1.066** (0.166)	-1.063** (0.166)	-1.066** (0.166)	-0.582** (0.191)	-0.582** (0.193)	-0.582** (0.191)
High school	0.827** (0.056)	0.827** (0.056)	0.827** (0.056)	0.741** (0.058)	0.741** (0.058)	0.741** (0.058)
Some college	0.279** (0.057)	0.279** (0.057)	0.279** (0.057)	0.263** (0.057)	1.003** (0.066)	0.263** (0.057)
College or more	0.464** (0.061)	0.464** (0.061)	0.464** (0.061)	0.405** (0.062)	1.406** (0.068)	0.405** (0.062)
Male	1.055** (0.038)	1.055** (0.039)	1.055** (0.038)	1.220** (0.043)	1.219** (0.043)	1.220** (0.043)
Black, Non-Hispanic	-0.130** (0.067)	-0.131* (0.067)	-0.130** (0.067)	-0.014 (0.074)	-0.016 (0.074)	-0.014 (0.074)
Hispanic	-0.321** (0.065)	-0.322** (0.065)	-0.321** (0.065)	-0.342** (0.069)	-0.343** (0.068)	-0.342** (0.069)
Age	-0.045** (0.007)	-0.045** (0.007)	-0.045** (0.007)	-0.047** (0.008)	-0.046** (0.007)	-0.047** (0.008)
Mental health	-0.727** (0.054)	-0.727** (0.054)	-0.727** (0.054)	-0.531** (0.059)	-0.529** (0.060)	-0.531** (0.059)
Constant	2.612** (0.367)	2.610** (0.365)	2.612** (0.367)	2.837** (0.378)	2.781** (0.376)	2.837** (0.378)

n=26,078

** = p<.01, * = p<.05 in second column indicate significance between early and late onset, in third column indicate significance between early onset and no disability.

^a Age of onset is the exact onset age for each sample member with a disability.

Table A1: Onset Age for Persons with Limitations Ages 22 to 64,
by Definition of Onset

Onset Age	<u>Onset Definition</u>	
	Earliest onset	Most severe limitation
Distribution for all Onset Ages (%)		
Onset age reported < 22	15.5	13.9
Range: <18	0.7	1.0
Range: 18 to 21	0.1	0.1
Actual or range: >=22	82.6	83.9
DK/NA	1.1	1.1
Distribution for Onset under Age 22 (%)		
At birth	41.0	36.5
1 to 10	14.3	15.6
11 to 21	37.8	40.6
Range: <18	4.4	6.6
Range: 18 - 21	0.7	0.7

Note: The “earliest onset” definition is used in our study.

Table A2: Source of Youngest Onset Age by Limitation Type,
for Persons with Limitations Ages 22 to 64

Type of Limitation	Percent
All Onset Ages	
ADL	21.1
IADL	47.6
Functional Limitation	30.2
DK/NA	1.1
Onset under Age 22	
ADL	21.8
IADL	46.7
Functional Limitation	31.5